

young hatched out 1877, from February 5th to 20th; departed between 1st and 21st of May. Special notes for June are as follows: Nebraska—Plattsmouth, not destructive but plentiful; North Platte, 15th, few flying north; Howard, hatching until June 15th, flying 20th to 30th, little damage. Dakota—Bismarck, 21st, 28th, 29th, flying NW. Colorado—Denver, 30th, very few have hatched. Kansas—Baxter Springs, 12th to 30th, flying NE., plenty remain in cold soils. Iowa—Vail, 30th, began to fly; Tabor, 30th, all gone. Missouri—Corning, plenty but not destructive. New Jersey—South Orange, 30th, all gone, little damage; Newark, 15th, slight damage; Vineland, 1st, plentiful, 14th, very few. D. C.—Washington, plentiful first ten days. New York—Starkey, 25th, seen; Wappinger's Falls, 1st, hatching, 13th to 18th, destructive, 26th, dying. Virginia—Alto Vista, 15th, all gone.

Balloon Ascensions.—Some information as to the condition of the atmosphere on June 18th and 19th, is given by the observations made during two balloon voyages starting from Nashville. The path of the balloon is shown on the accompanying Chart IV. The observations will be presented in full in the annual report of the Chief Signal Officer; they show that the bases of the cumulus clouds were formed at an altitude corresponding to the pressure of 25.50 inches at 5:40 p. m., but of 27.85 inches at 8 a. m., the temperature of their bases being, respectively, 79° and 78°. The highest point attained was at pressure 16.65 inches (where the temperature was 43° and the wet bulb thermometer read 36) on June 19th, 11:55 a. m., at which time the record at Nashville Signal Service station (altitude 504.2 feet) was 29.58, 86.5, 75.5, respectively.

Polar Bands.—Guttenberg, Nov. 22nd; Carthagena, Ohio, 1st, 3rd, 13th, 22nd, 29th; Denver, Col., 5th, 12th, 25th.

Sunsets.—The characteristics of the sky, as indicative of approaching fair or foul weather, have been observed daily, at sunset, at all Signal Service stations. The monthly means, from 97 stations, show that 74 doubtful cases, or blanks, were recorded, and that out of the remaining 2,832 cases 2,162, or 76.3 per cent. have been followed by the expected weather.

Forest fires prevailed in northern Michigan during the first 10 days of the month, being generally extinguished by rain on the 9th. Fire or smoke was also reported as follows: 1st, Greenville, N. C.; 3d, 4th, 5th, Kittyhawk, N. C., (in marshes); 4th, Southington, Conn.; 6th, Hennepin, Ill.; 15th, 23d, Detroit, Mich.; 23d, West Waterville, Me.; 30th, Santa Fe, N. Mex., (for several days.)

Meteors were observed as follows: 1st, Davenport, Iowa; 3d, Carthagena, Ohio; 11th, Monticello, Iowa; 12th, Mt. Auburn, Ohio; Louisville, Ky.; Indianapolis and Fort Wayne, Ind., and Detroit, Mich.; 13th, Litchfield, Mich., (10 p. m.) Bellefontaine, Ohio; 14th, Monticello, Io., Philadelphia, Pa.; 15th, Carbondale, Ill., (NW to SE) Mt. Sterling, Ill.; 16th, Waterburgh, N. Y.; 17th, Monticello, Io.; 19th, Merom, Ind.; 20th, Merom, Ind.; 21st, Leavenworth, Kan.; 24th, Davenport; 25th, Point Pleasant, La.; 26th, Point Pleasant, La.; 27th, Brook Haven, Miss.; 28th, Monticello, Io., Starkey, N. Y.; 29th, Point Pleasant, La., (zenith to SE, and meteoric shower;) Brook Haven, Miss., Freehold, N. J., (11 p. m. loud explosion,) Newark, N. J.; 30th, Summit, Col., Brook Haven, Miss., Salem, N. J., (10 p. m.) Melissa, Tx., (8 p. m.) Bloomfield, Wis., (10:40 p. m., followed by explosion in 3 to 5 minutes.

Zodiacal light.—Carbondale, Ill., 19th to the 28th. Savannah, Ga., 1st, 2nd, 3rd, 6th and 30th.

Earthquakes.—3rd, near Stanford, Ky., small local disturbance. 11th, volcanic disturbance 60 miles from Yuma, near Flowing Well, Cal. 18th, Milwaukee, 7:30 p. m.; water in Lake Michigan fell two feet in one-half hour, and rose again much more quickly.

SOLAR PHENOMENA.

Sun-spots.—The following observations, made by Mr. D. P. Todd, upon the spots on the sun, have been kindly communicated by Rear-Admiral John Rodgers, U. S. N., Superintendent of the Naval Observatory:

June, 1877.	No. of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Remarks.
	Groups	Spots.	Groups	Spots.	Groups	Spots.	Groups	Spots.	
11th, 5 p. m...	1	13±	0	0	0	0	1	13±	Spots very small and closely aggregated.
13th, 9 a. m...	0	0	0	0	0	0	0	0	
19th, 9 a. m...	0	0	0	0	0	0	0	0	
20th, 9 a. m...	0	0	0	0	0	0	0	0	
21st, 10 a. m...	0	0	0	0	0	0	0	0	
22nd, 10 a. m...	0	0	0	0	0	0	0	0	Several prominent groups of sizeable faculae.
23rd, 8 p. m...	0	0	0	0	0	0	0	0	
23rd, 6 p. m...	1	2	0	0	0	0	1	2	
24th, 1 p. m...	0	0	0	0	0	0	1	2	
25th, 8 a. m...	0	3	0	0	0	0	1	5	
26th, 10 a. m...	0	1	0	0	0	0	1	6	Solar disk almost completely mottled with faculae, many of them large.
27th, 9 a. m...	0	0	0	0	0	0	0	0	
29th, 6 p. m...	1	2	0	0	0	0	1	2	
30th, 9 a. m...	0	0	0	0	0	0	1	2	Several large faculae; one of the spots is penumbral—quite without dark or well-defined nucleus.

Professor Tacchini reports to the Paris Academy of Sciences that, "on the 3rd, a small spot (the only one) appeared in the east, and gradually enlarged to 40s., by the 7th continuing of this size (some small spots which presently appeared with it ever changing) till it was near the border on the 13th. On the 14th, when projection and photography revealed hardly a trace of the group, the spectroscope discovered very lively chromospheric flames; higher up, several oblique fragments, evidently from violent eruption, eruption flames on the right, and lastly, a nebulous chromospheric mass, well illuminated and slightly divergent. There was constant commotion of matter."

NOTES AND EXTRACTS.

Prof. R. Wolf communicates to the Quarterly of the German Astronomical Association, (Vol. II, p. 87,) a report on his sun-spot investigations, as follows: "I have continued the observation of the condition of the solar spots (a work begun by me at the end of 1847 in extension of the work of Schwabe and Schmidt, and since then prosecuted uninterruptedly) at least once in every clear day, and very frequently many times and with different telescopes, and have thus obtained, for 270 days of the year 1876, the number g of visible groups and number f of their constituent spots and points, whence I have by the formula $r = k(f + 10g)$ computed the relative number r as first introduced by me in 1850. In this k indicates a certain factor, depending upon the observer and instrument; it is assumed as unity for myself using a magnifying power of 64 applied to a four-foot Fraunhofer refractor, and is for other observers or instruments to be deduced from corresponding series of observations. By supplying the record on days that were cloudy at Zurich from other observations made by Messrs. Weber in Peckeloh, Schmidt in Athens, Denza in Moncalieri, Tacchini in Palermo, I find r equal 11.3 as the mean of all the relative numbers for each day of the year 1876, and in connection with the mean relative numbers of the previous years I have the series:

YEAR	r	YEAR	r	YEAR	r	YEAR	r	YEAR	r
1867	7.3	1869	73.9	1871	111.2	1873	66.3	1875	17.1
1868	37.3	1870	139.1	1872	101.7	1874	44.6	1876	11.3

in which the periodicity of the sun-spot phenomena is clearly shown.

Prof. E. Loomis communicates to the American Journal of Science the following conclusions:

1. Areas of low barometer result from a general movement of the atmosphere towards a central area, and this movement is accompanied by a deflection of the wind to the right, which causes a tendency to circulate around the centre with a motion spirally inward.
2. This deflection to the right, which results from the earth's rotation, causes a diminished pressure within the area of this inward movement, and the pressure is still further diminished by the centrifugal force resulting from the circulation about a centre.
3. The amount of the barometric depression depends upon the force of the wind and the geographical extent of the revolving atmosphere. The effect of centrifugal force is not considerable except when the velocity of the wind approaches that of a hurricane. With a velocity of one hundred miles per hour, the depression due to centrifugal force may amount to about two inches; but in the winter storms of the middle latitudes with a velocity not exceeding 40 miles per hour, the depression due to centrifugal force seldom exceeds one or two-tenths of an inch. In these storms, three-quarters of the observed depression of the barometer is usually the effect of the earth's rotation; but in order that the depression at the centre may amount to as much as one inch, it is generally necessary that this system of circulating winds should prevail over an area nearly 2,000 miles in diameter.

[To be continued in July Review.]

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